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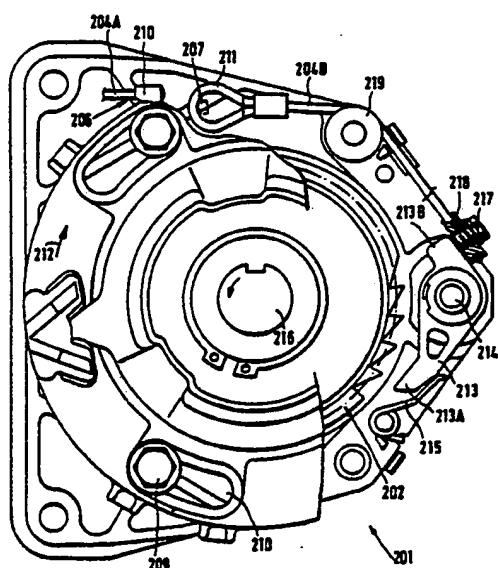
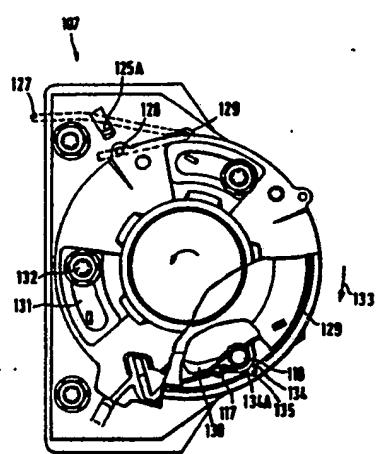
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(54) Title: AN ARRANGEMENT FOR PREVENTING A DOOR FROM DROPPING DOWN PRECIPITATELY

(57) Abstract

<img alt="Technical drawing of a door locking mechanism. The left diagram shows a cross-section of a door panel with various components labeled: 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 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An Arrangement for Preventing a Door
from Dropping Down Precipitately.

The present invention relates to an arrangement for preventing a door which is movable in a substantially vertical direction and can be acted upon by a number of balancing springs from dropping down precipitately.

5 The main object of the present invention is firstly to provide an arrangement of the above-described kind which functions with simple means in an effective and reliable manner when the spring function of the existing balancing springs fails due to breakage or some other cause.

10 The said object is achieved by means of an arrangement according to the present invention, which is essentially characterised in that a balancing spring is connected to a spring fixing which is forcibly moved towards a stop position when the spring force effect of the balancing spring connected to it fails, and that a number of locking elements which are forcibly moved into a position wherein they co-act with a locking device which is connected to an operating arrangement provided for the door are incorporated in the arrangement, the said locking device 15 being designed to stop or reduce the continued movement of the door by the effect of the locking elements.

20 The invention is described below by way of three preferred embodiment examples with reference to the accompanying drawings, on which

25 Figures 1-8A show a first embodiment example of an arrangement according to the invention for preventing a door from dropping down precipitately,

30 Figures 9-27A show a second embodiment example of an arrangement constructed according to the present invention for preventing a door from dropping down precipitately, and

Figures 28-31 show a third embodiment example of an



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arrangement constructed according to the invention for preventing a door from dropping down precipitately.

Figure 1 shows an arrangement in a sectional view along the direction of its axis,

5 Figure 2 shows part of the arrangement with it held in a non-actuated stop position,

Figure 3 shows part of the arrangement with it held in an actuated stop position,

Figure 4 is an end view of the arrangement,

10 Figure 5 is a side view of the arrangement,

Figure 6 is a side view of an axle appertaining to the arrangement, with the associated adjoining locking wheel provided with holes,

Figure 6A is an end view of a locking wheel,

15 Figure 6B is a section along the line A-A in Figure 6,

Figure 7 is a side view of a fixing element,

Figure 8 is a side view of a fixing element,

Figure 8A is a sectional view of a fixing element with the locking elements received in it,

20 Figure 9 shows a door spring arrangement with its associated stop unit and trigger unit and the interlinking thereof,

Figure 10 shows a further embodiment example of a door spring arrangement with its associated stop unit and trigger unit,

25 Figure 11 shows the cross-linking connection for such stop units and trigger units,

Figure 12 shows a further embodiment of the cross-linking connection between a stop unit and a trigger unit,

30 Figure 13 shows a stop unit viewed transversely across its axis of rotation,

Figure 14 shows the stop unit viewed along its axis of rotation,

35 Figure 15 shows a trigger unit viewed transversely across its axis of rotation,

Figure 16 shows the trigger unit viewed along its

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axis of rotation,

Figure 17 shows another embodiment example of a trigger unit viewed from the side,

5 Figure 18 shows the trigger unit shown in Figure 17 viewed from straight in front,

Figure 19 shows a brake housing appertaining to the said embodiment example, viewed from the side,

Figure 20 shows the said brake housing viewed from straight in front,

10 Figure 21 is a sectional view through parts appertaining to the brake housing,

Figure 22 shows the same parts viewed in the axial direction,

Figure 23 shows a locking wheel, viewed from the side,

15 Figure 24 shows the same locking wheel viewed from the left of Figure 23,

Figure 25 shows a locking device incorporated in the brake housing, partially cut away,

20 Figure 26 shows the locking device from one of its sides,

Figure 27 shows a part of the opposite side of the locking device,

Figure 27A is a sectional view along the line B-B in Figure 27,

25 Figure 28 is a side view, shown partially cut away, of a further arrangement according to the invention,

Figure 29 shows the arrangement viewed from straight in front,

30 Figure 30 shows a further front view of the arrangement, and

Figure 31 shows a locking dog incorporated in the invention, viewed from the side.

35 An arrangement designed according to the present invention for preventing doors which are movable in a substantially vertical direction in a doorway or some other aperture which it is desired to open up or close from

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dropping down precipitately if the balancing spring should break or if the spring effect should cease due to some other cause, e.g. if a balancing spring should come away from its associated spring fixing or if the spring effect should act in the wrong direction of rotation. The arrangement functions both on hand-operated and mechanically operated doors and is not actuated until the spring failure occurs. The arrangement is also simple to mount in place, and provides a high level of safety, effectively stopping the door over a short distance when spring failure occurs. Moreover, subsequent adjustment is not required, and re-setting of the arrangement or replacement of parts after actuation is simple and requires no special tools. The arrangement is reliable and actuation is not initiated by vibrations and impacts during the movement of the door.

According to the invention the arrangement is intended to be composed of three units, namely, a stop unit, a trigger unit and, in the present case, a cross-linking connection unit.

In Figure 1 a first embodiment of an arrangement 1 according to the invention for preventing a door from dropping down precipitately is shown. A trigger unit 2 is formed in the said arrangement 1 of a spring holder 3, preferably constructed as a plate, which bears a plurality of spring fixings 4 with which one end 5A of a balancing spring 5, preferably made as a helically wound spring, is connected, for a door which is designed to be guided in tracks along its side edges and moved along the said tracks to open up or close a doorway, etc. disposed between these guide tracks. A cover 6 around which the spring 5 extends is rigidly connected, for example by welding, to the spring holder 3 and forms a so-called "neck" for the spring fixing which is formed as a neck fixing. An axle 7 extends through an opening 8 in the outer end 6A of the cover while a holder 9, over the circumference of which



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a plurality of locking elements 10 are disposed, distributed along the axial extent of the arrangement, preferably rigidly connected to the holder 9, and preferably pin-shaped. A pressure spring 11 or a spring arrangement of some other suitable kind is designed to act between the said holder 9 and the cover 6, forcibly urging the locking elements 10 in the axial direction of the arrow 12, towards a locking wheel 13 provided with holes. The said locking wheel 13 is expediently mounted via one 10 end 14A of a clamping collar 14 connected to the said axle 7 and non-rotatable relative thereto. The axle 7 extends through the arrangement 1, which can be doubled up due to the fact that the clamping collar 14 may be fitted with a further locking wheel 13¹ on the opposite 15 end 14B of the collar with which appropriate locking devices arranged in another arrangement which is provided for preventing precipitate dropping down can coact in a similar way as in the arrangement described above. The clamping collar 14, which is preferably slit 20 along one of its sides, is connected via a bracket connection 15 to a plurality of wall mounting brackets 16 for example, and is securely clamped to the axle 7 by means of a plurality of bolt units 17 around a wedge 7B which acts between the axle 7 and the collar 13.

25 Over the circumference of the said locking wheels 13 and 13¹ respectively there are a number of receiving holes 18 adapted to the locking devices 10.

A fixed plate or a similarly constructed fixed element 19 is connected to the bracket 16 by means of screws, 30 for example, so that it cannot be rotated. The said fixed element 19 has a sleeve-shaped bearing mounting 21 which is designed to accommodate, for example, a circular ball bearing 22 to act between the axle 7 and the arrangement 1 containing the fixed element.

35 A plurality of spacer sleeves 23 are accommodated in corresponding slit-shaped grooves 24 extending over



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the circumference of the fixed element 19 and in holes 25 adapted to the sleeves 23 and extending through the spring holder 3, and are held together by means of a screw 26 and a nut 27 in such a way as to allow them to be rotated 5 relative to each other.

A trigger spring 28, such as a helical tension spring, for example, is fixed by one 28A of its ends to a part 19A of the fixed element 19 and is connected by its other end 28B to a spring fixing lug 29 projecting out from the 10 spring holder 3.

The operation of the above-described arrangement is as follows: During normal operation of the door the tension moment is transferred from the balancing spring 5 which is connected non-rotatably via its other free end to 15 the axle 7 which forms the connection to a door-operating arrangement, such as a cable pulley, for example. Normally the spring 5, or springs in the case where more than one spring is provided, balances the door so that it can be moved easily in the desired direction. When, for example, 20 spring breakage or some other spring failure occurs the tension moment from the spring 5 ceases to act on the spring holder 3. Due to the effect of the spring 28 the said spring holder 3 is thereby made to rotate in the direction of the arrow 30 which is made possible due to the 25 fact that the greater moment which is obtained from the spring 5 has ceased to exist. A number of through-bores 31 adapted to the said locking elements 10 thereby come into position directly in front of their respective locking elements 10 which were previously urged by the spring 30 11 to rest against the fixed element 19 on a sliding surface 19B which is bounded in the lateral direction by the said bores 31, which can also be surrounded by the sliding surfaces. The locking elements 10 quickly come into engagement with their associated corresponding hole 18 on 35 the locking wheel 13 or 13¹ respectively after they are inserted via their front section through the bores 31



and the spring holder 3 rotates around the axle 7 as the guides 23 move along the tracks 24 in the fixed element 19. The locking wheel 13 is hereby prevented from rotating with the axle 7 and the movement of the door ceases or is reduced in this way. The axle 7 acts here with a damping effect since it acts like a torsion spring which prevents the operating mechanism, such as ropes and axles, for example, from being overloaded by violent jerking due to the direct and effective locking of the movement. It is consequently desirable that the arrangement be mounted with a certain minimum spacing from the cable drum, etc.

After the arrangement has been actuated it is possible to re-set it to the ready-for-locking state, after any replacement of balancing springs, etc. which may be required.

By means of a split pin 32, for example, which acts between the fixed element 19 and the spring holder 3 it is possible to prevent the movement of these parts, for example when the arrangement is being assembled.

An arrangement 101 or 201 respectively according to the invention for preventing a door from dropping down precipitately, which is shown on the drawings in Figures 13-27 and 28-31 respectively, may comprise three units: namely, a stop unit 102 or 202 respectively, a trigger unit 103 or 203 respectively, and a cross-linking connection unit 104 or 204 respectively, and the arrangement contains at least the first two said units.

Figure 9 shows how, depending on door weight and hoisting speed, for example in an arrangement according to Figures 13-27, two trigger units 103 are both joined to their respective balancing spring 106 connected to a hoisting operation axle 105, with a stop unit 102 connected to one of the trigger units 103 and linked to the other trigger unit 103 via a cross-linking connection unit 104.

Figure 10 shows how trigger units 103 joined to



their respective balancing spring 106 are connected to their respective stop unit 102 located by the respective trigger units 103, and are connected in a cross-over fashion to each other via the cross-linking connection units 5 104.

Figure 11 shows the coupling together of two separately mounted trigger units 103 with an integrated trigger and stop unit 107 via a cross-linking connection unit 104 made up of spring-loaded lines 108.

10 Figure 12 shows how the cross-linking connection unit 104 can be composed of a plurality of separate interconnected lines 109.

15 A stop unit 107 constructed according to the invention and integrated with a trigger unit, as shown on the drawings in Figures 10-20 and 21-27, or a separate stop unit 102, which is shown in Figures 13-14, comprises two elements which are counter-rotatable relative to each other, namely, a locking ring 110 and a locking device 111, which are designed to rotate with each other when the door is 20 operating normally. The said elements 110, 111 have a plurality of friction surfaces 112 and 113 respectively, disposed over the opposing side surfaces 110A and 111A respectively and sloping in a tangential direction; these friction surfaces are continued into surfaces 114 and 115 25 respectively which extend in the axial direction. Over the circumference of the locking ring 110 a plurality of tooth elements 116 are arranged, preferably evenly distributed; with these elements 116 a plurality of locking dogs 117 which are bearing-mounted so that they can rotate around the bearings 118 disposed on the circumference of the arrangement 102, are able to co-act.

30 The locking device 111 is connected non-rotatably to the locking ring 110 during normal operation, for example by means of the tooth elements 110B and 111B respectively. 35 The two elements 110, 111 are acted upon by a spring element 120, preferably a stack of disc springs compressed



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between locking elements 121 and 122 respectively such as locking rings, for example, which co-act with the axle arrangement and are provided on either side of the elements 110, 111 and the said springs 120, urging them towards each other so that the locking devices 114, 115 are engaged with each other during normal operation of the door. The flange arrangements 123 and 124 arranged between the two elements 110, 111 respectively are designed to form a rotating bearing between the elements 110, 111.

In order to avoid peak loading on the axle 105 when the braking phase is begun, and to reduce the effect on the braking moment of the coefficient of friction at the sloping surfaces 112, 113, the friction surfaces on the two elements 110, 111 are, as stated above, made with a sloping plane. This makes it possible for the braking moment to be engaged "gently" and to be increased with the rotary angle until the maximum value is reached and/or the movement of the door is stopped. To obtain the greatest possible quantity of work it is expedient to select the springs 120 with a degressive spring characteristic. The desired braking moment for the arrangement can easily be obtained, as stated, by varying and adjusting the spring force and/or varying the angle of inclination A at the friction surfaces 112, 113.

In the arrangement 107 which is shown in Figures 19-20 one end of a balancing spring 106 can be connected to a spring holder 125 and its other end to the drive axle 105.

A trigger unit 103 which is shown in Figures 15-16 and 17-18 and which comprises a spring holder 126 to which a second balancing spring, quite separate from the balancing spring which is connected to the spring holder 125 in the arrangement 107, is connected, is connected to the spring holder 125 via a cross-linking connection unit made, for example, as a cord 127, by passing it



- 10 -

through an opening 128 in the periphery thereof. The cord 127 also extends via a releasing ring 129 which is designed to act on the locking dogs 130, which are urged by the spring element 117 to pivot in the direction of the 5 element 110 and the toothed segment appertaining thereto.

The cord 127 extends further over a pulley or the like (not shown) to a further trigger unit 103. If the cord 127 should go slack, which occurs if any of the interconnected balancing springs breaks or its spring effect 10 is reduced in some other way, the spring fixing 125 which is guided over the circumference of the arrangement 107 in slit-shaped openings 131 via controlling bolts 132, is able to rotate in the direction of the arrow 133, and thereby rotates the releasing ring 129 with it. When the 15 cord 127 goes slack the locking dogs 130, which are normally influenced by the ring 129 by co-action between a projection 135 provided on the respective locking dogs 130 and a stop 134A located at one end of a slit-shaped recess 134 in the ring 129, for example, forcing them out 20 of engagement with the tooth elements 116 on the element 110 against the effect of the respective springs 117 on the respective locking dogs 130, are able now to be pivoted round the locking dog mountings 118 under the effect of the associated springs 117, and in towards the tooth elements 116 on the element 110, blocking its rotary movement. 25

With the element 110 locked against continued rotary movement, under the effect of the drive arrangement for the door the element 111 strives to continue to rotate. 30 Due to the slope on the sliding surfaces 110A and 111A respectively, the stack of springs 120 is compressed and the braking moment is increased rapidly, whereby the movement and the operation of the door is stopped.

The trigger unit 103 consists of an above-mentioned 35 spring fixing 126 and a fixed bracket 136 around which the spring fixing 126 is rotatably mounted via pins 137



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which are accommodated in slit-shaped openings 138 disposed in the spring fixing 126, i.e. there are similar parts to those which form the stop unit located in the central part of the unit 107. A trigger spring 140 acts 5 between the spring fixing 126 and the bracket 136, urging the fixing 126 to rotate relative to the bracket 136.

Re-setting of the arrangement again in the ready-for-braking state is effected simply by coupling up the existing cross-linking connection cords 127 in the above- 10 mentioned way, after replacing any faulty balancing springs etc.

The arrangement shown in Figures 28-31 again has an integrated trigger and stop unit 205, wherein trigger cords 204A and 204B respectively on the respective units 15 205 are connected releasably via a cord-fastening 206 which acts between the stop unit 202 and the trigger unit 203 of the unit 205, and is connected via its opposite end to a corresponding similar unit with a releasable cord fastening part 207, located at a distance from the said 20 unit 205. When either of the said units 205, which are identical to each other and each have their own spring fixing 208 for the connection of their respective balancing springs, are triggered, the fixing 208 is rotated relative to the stop unit 202, so that the fixing 208 25 which is accommodated in the same way as described above, via guide pins 209 in guide slits 210, with its connected fixing parts 206A and 207 appertaining to the said cord-fastening 206 and cord-fastening part 207 respectively allows the ends 210 and 211 respectively of the cords 30 204A and 204B respectively to be released from their engagement with an appropriate fixing part 206B or 207B respectively located on the stop unit 202, so that due to the effect of the trigger cord 204B functioning as a trigger unit the spring fixing 208 is rotated in the direction of the arrow 212. A locking element 213 constructed 35 as a dog and mounted so that it can rotate around a



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mounting 214, being acted upon by a spring element 215 urging it to pivot via its front end 213A in the direction of a locking ring appertaining to a similar stop arrangement to that shown in Figures 21-27, is released to effect
5 the stopping or reduction of the operation of the door operating arrangement connected via the axle 216, in a similar way to that described above. A line pulley 218, around which the cord 204B is looped before or after the cord is passed to or from its rigidly-mounted cord pulleys
10 219 and 220 respectively, is mounted by means of a screw 217 located at the rear end 213B of the locking element 213.

Re-setting of the arrangement in the so-called loaded state is achieved by locking the cord ends 210 and 211
15 respectively in the cord fixing 206 and the cord fastening part 207 respectively, after dealing with the balancing springs.

The invention is not limited to the embodiment examples described above and shown on the drawings, but may
20 be modified within the framework of the following Patent Claims without exceeding the scope of the concept of the invention.



Patent Claims

1. An arrangement for preventing a door which is movable in a substantially vertical direction and is acted upon by a plurality of balancing springs from dropping down precipitately, characterised in that a balancing 5 spring is connected to a spring fixing (3, 4; 125, 126; 208) which can be acted upon forcibly to move it towards a stop position when the spring force effect fails, and that a plurality of locking elements (10; 130; 213) which are forcibly acted upon to move them into a position co- 10 acting with a locking device (13, 110) which is connected to an operating arrangement provided for the door, are incorporated in the arrangement, whereby the said locking device (13, 110) is designed to stop or reduce the continued movement of the door by the effect of the locking 15 elements.
2. An arrangement according to Patent Claim 1 wherein the balancing spring consists of a helically wound spring, characterised in that the spring is connected by one of its ends to a spring fixing mounted on a spring holder (3; 125; 20 126; 208) which is mounted so that it is rotatable relative to the locking device (13; 110) and a fixed element preferably constructed as a fixed plate, respectively, and that a trigger arrangement, such as a trigger spring, for example, which is designed to act between the said spring 25 holder and fixed element, is designed to rotate the said spring holder relative to the fixed element.
3. An arrangement according to Patent Claim 2, characterised in that the fixed element (19) has a plurality of holes (31) through which the locking elements may 30 pass, and which are designed to come into a position directly in front of the correspondingly adapted locking elements (10) after rotation of the fixed element (19) and the spring holder (3) relative to each other, for the subsequent introduction of the locking elements (10).



4. An arrangement according to Patent Claim 3, characterised in that the locking elements (10) consist of pins which can be received in at least one locking wheel (13) equipped with holes and connected to an axle mounted in a bearing connected to a door operating arrangement, this axle (7) preferably being designed to act as a torsion spring element to damp movement transmitted to the operating arrangement.

5 5. An arrangement according to Patent Claim 4, characterised in that a plurality of pins (10) which are movable in the axial direction are mounted on a holder (9) which can be acted upon forcibly by a pressure spring arrangement (11) to move it in the direction of the said pin-receiving holes (18) in order to stop the continued 10 rotary movement of the locking wheel.

10 6. An arrangement according to either of the above Patent Claims 1-2, characterised in that a locking ring (110) can be acted upon forcibly by a spring element (120) to move it in the direction of a locking device (111) and is mounted non-rotatably relative to a door operating 15 arrangement axle arrangement (119; 216), this locking ring (110) and locking device (111) being designed to rotate normally counter to each other.

15 7. An arrangement according to Patent Claim 6, characterised in that the locking ring (110) has tooth elements (116) distributed over its circumference, with which a locking dog (130; 213), which can preferably be acted 20 upon by a releasing ring (129) which can co-act with a spring holder, is designed to come into engagement, and 25 that the locking ring (110) and the locking device (111) have friction surfaces (112, 113) sloping in a tangential direction which may co-act with each other and which are 30 continued into a locking device (114, 115) extending in the axial direction.



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8. An arrangement according to any of the above Patent Claims, characterised in that a locking dog (213) which is mounted so that it can pivot around a bearing (214) located on the outside of the locking ring (110) 5 is connected via one of its ends (213B) by a cord (204B) or the like to a cross-linking connecting arrangement which can be connected to a spring holder (208) and which is designed to act on the locking dog (213) in the event of spring failure, to pivot it into an engaged position 10 co-acting with the locking ring (110).

9. An arrangement according to Patent Claim 8, characterised in that the locking dog (213) has a deflecting element (218), preferably in the form of a cord pulley (218), adapted to the cross-linking cord (204B), this 15 cross-linking cord (204B) being connected by one (211) of its ends to a fastening (207) joined to a spring holder (208) from which fastening the cord (204B) is designed to be released when the spring holder (208) rotates.

10. An arrangement according to any of the above 20 Patent Claims 6-9, characterised in that the said spring element (120) for providing the effect of actuating the locking ring (110) and the locking device (111) comprises a plurality of springs which display degressive spring characteristics, preferably disc springs.



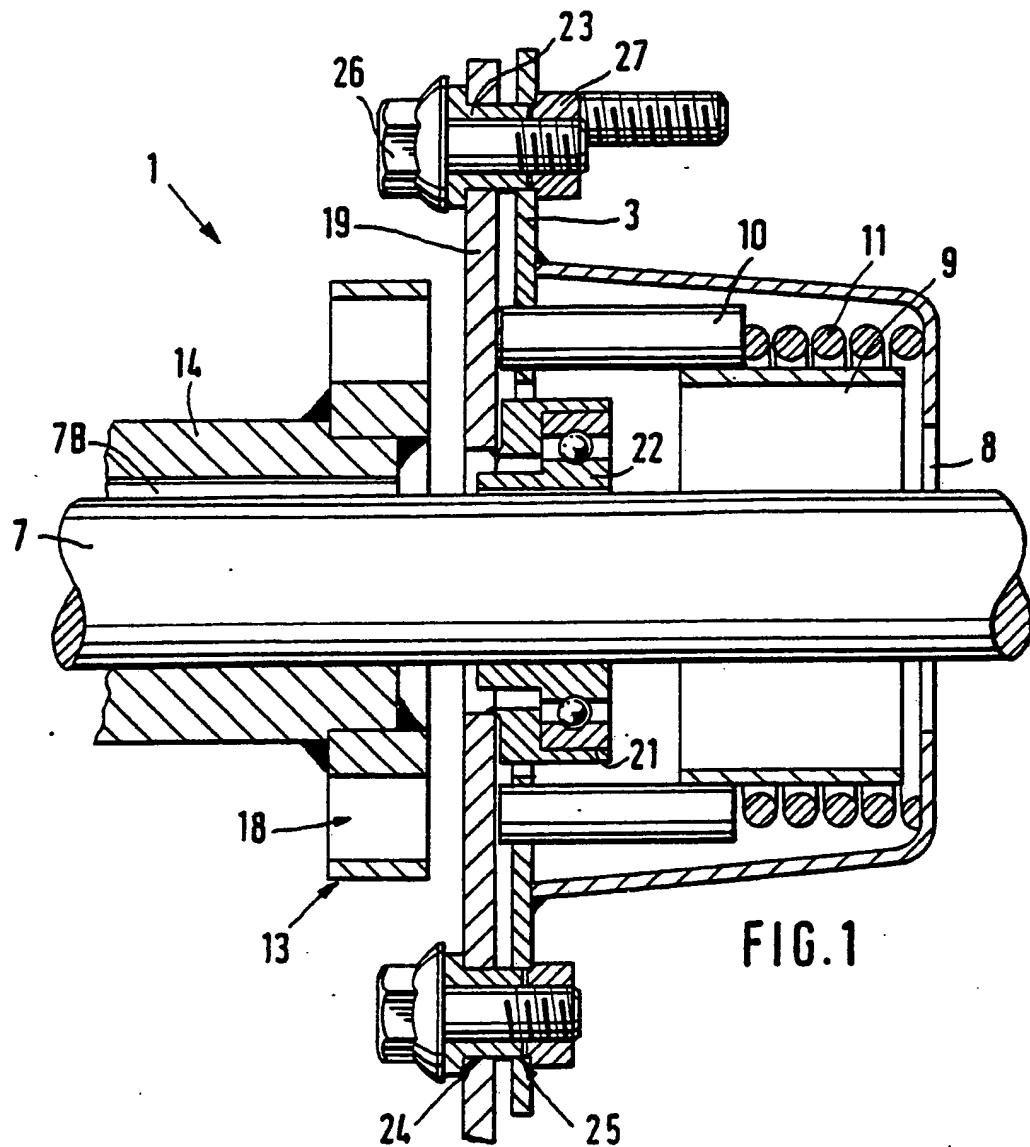


FIG. 1

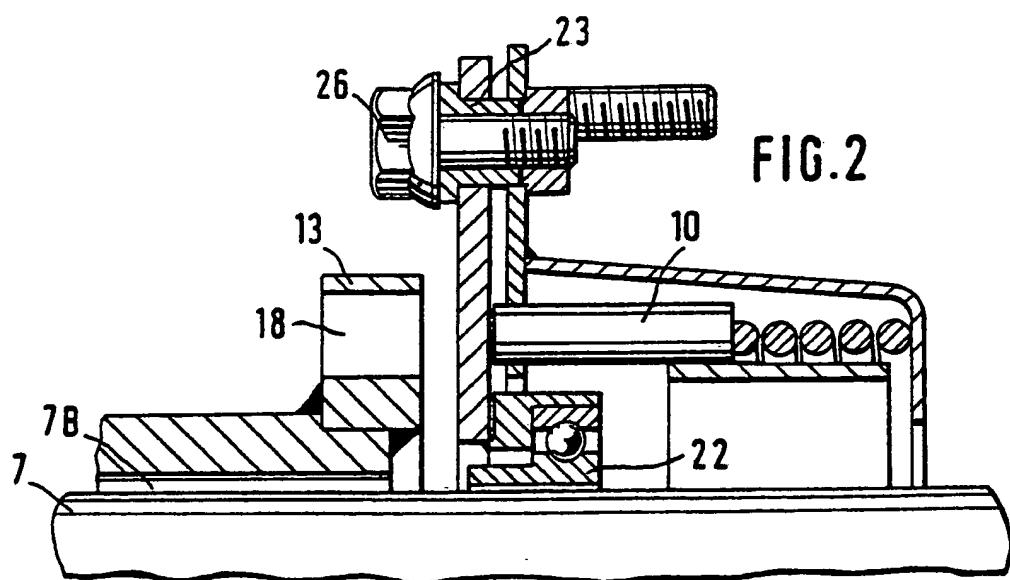


FIG.2

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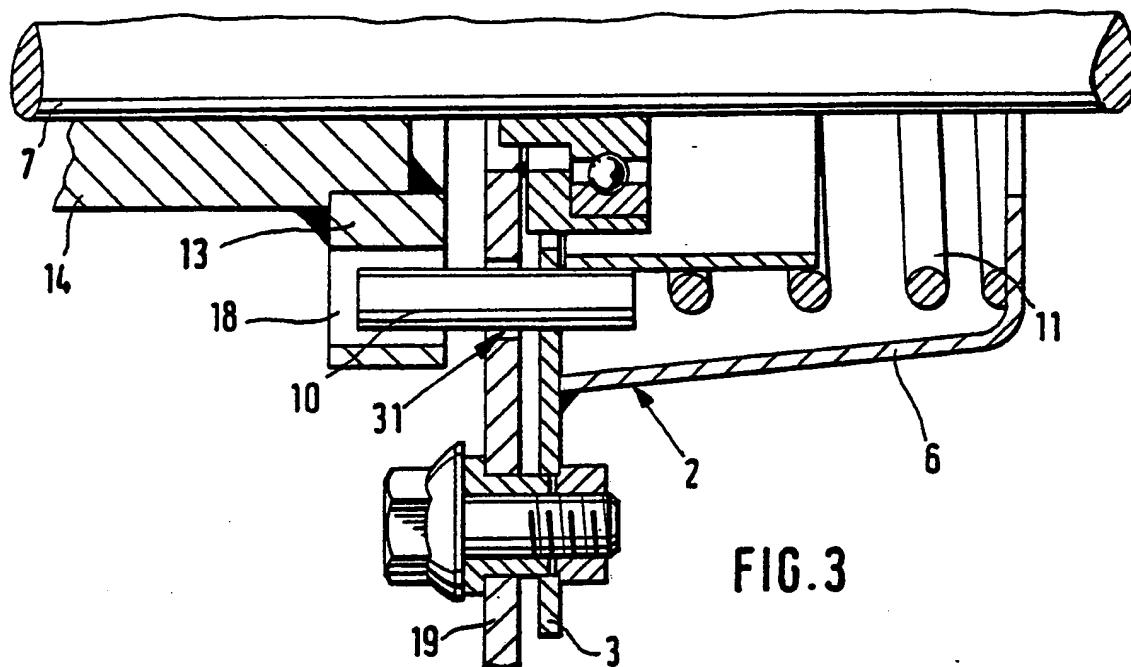


FIG. 3

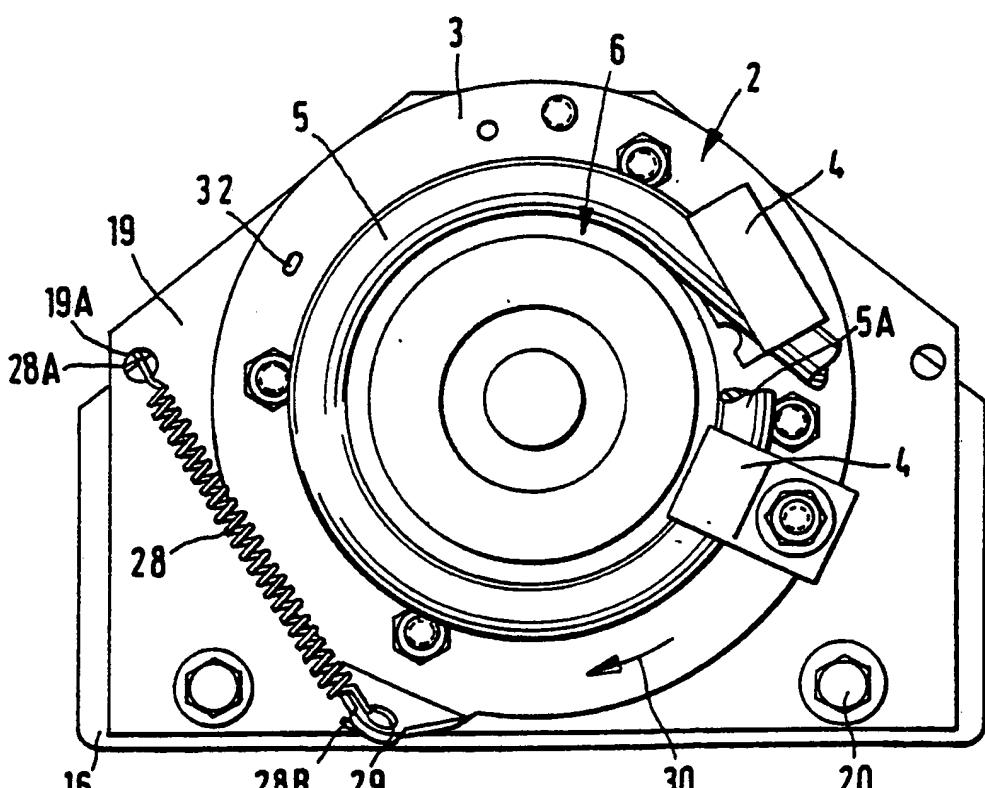


FIG. 4

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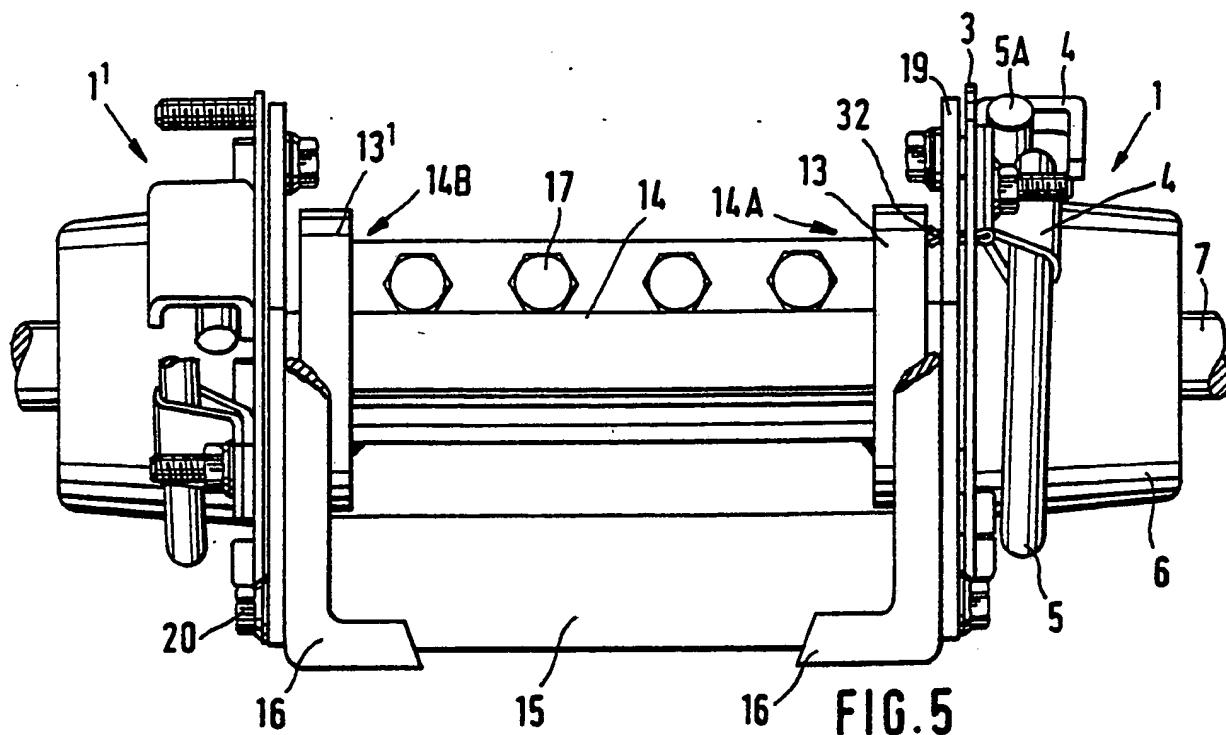


FIG. 5

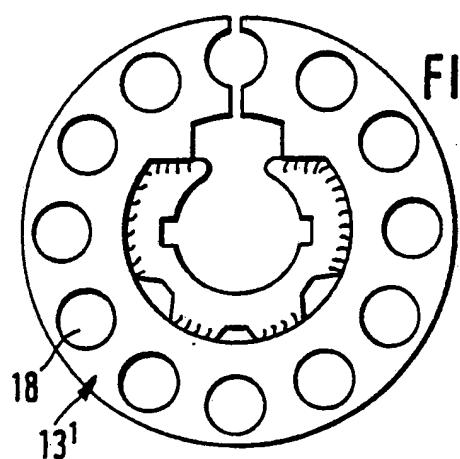


FIG. 6A

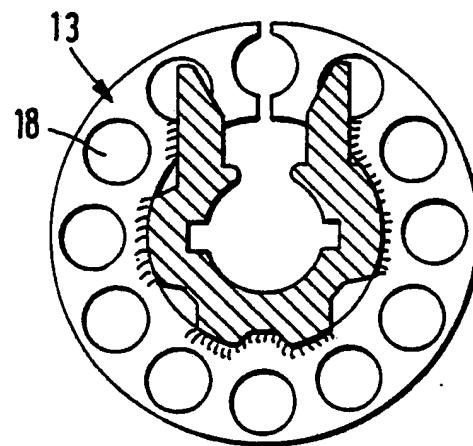


FIG. 6B

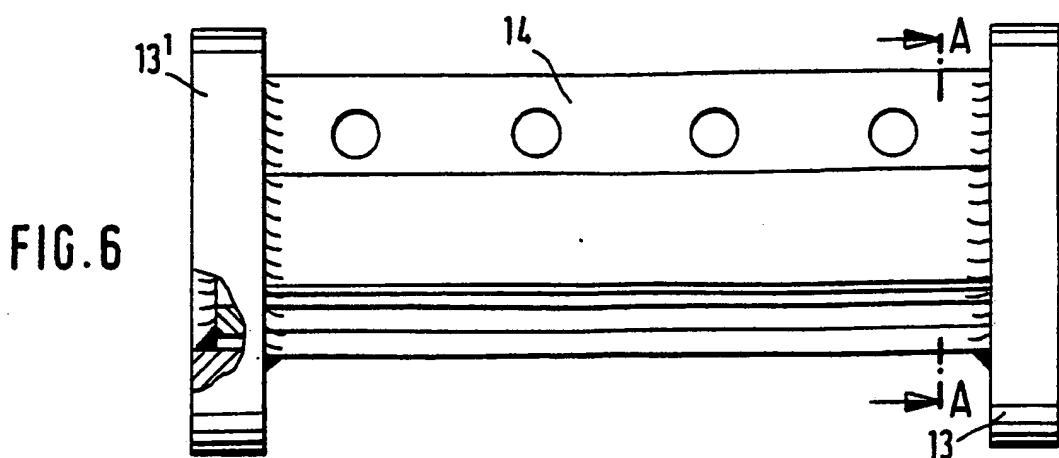


FIG. 6

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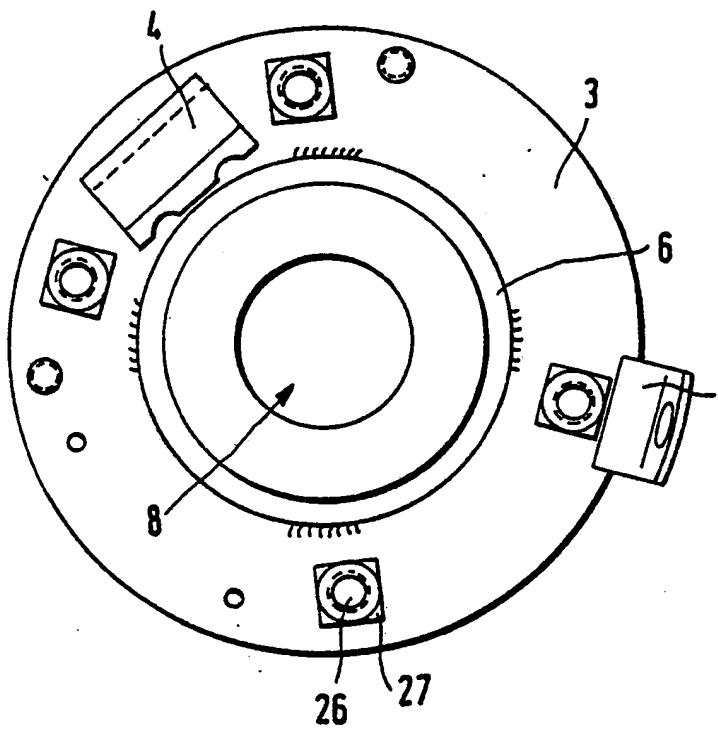
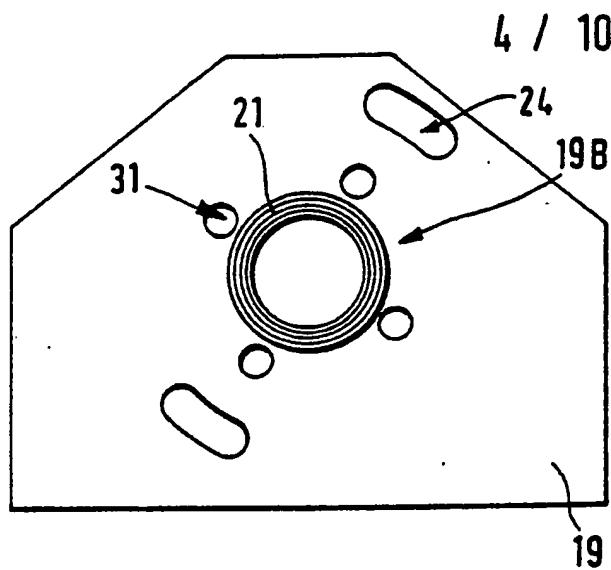
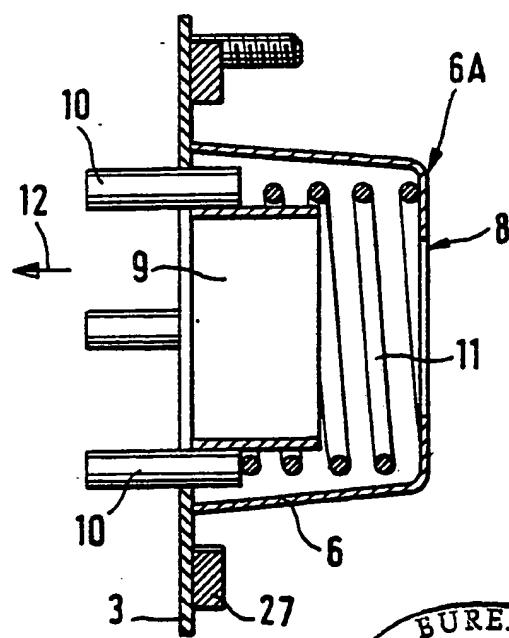
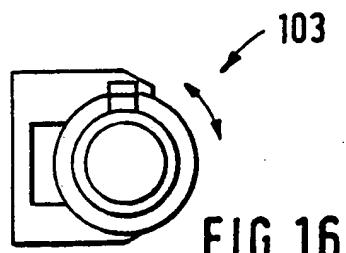
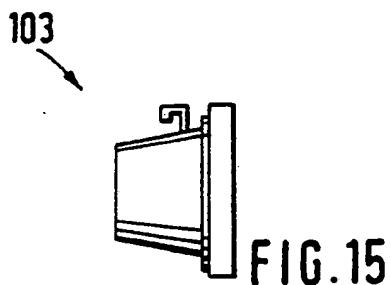
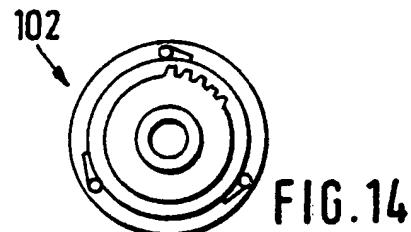
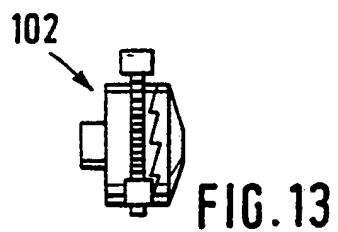
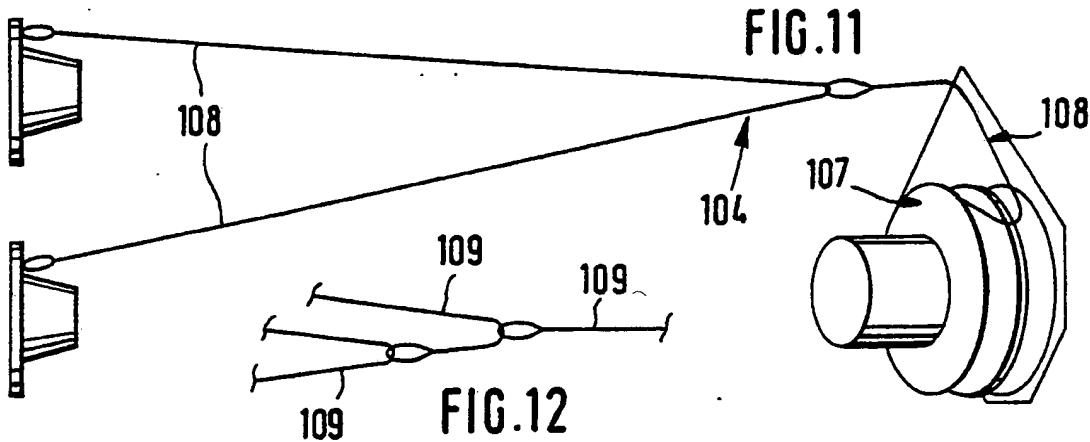
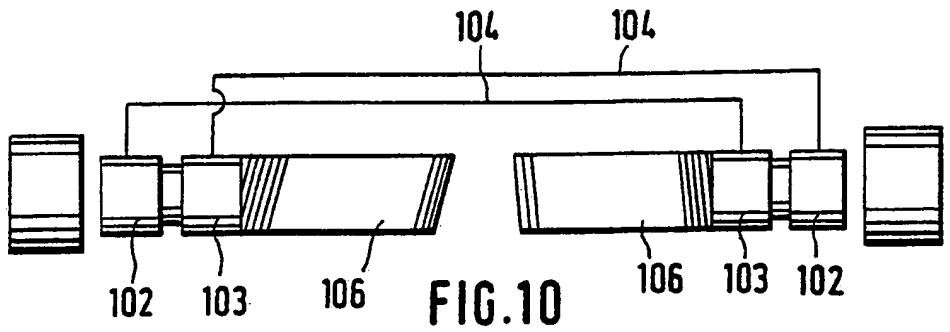
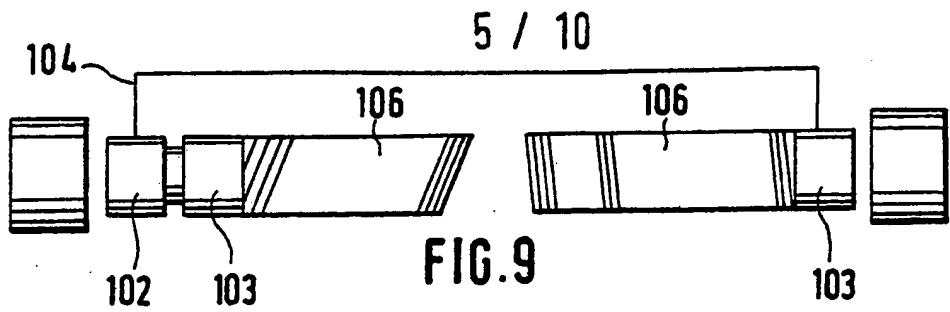
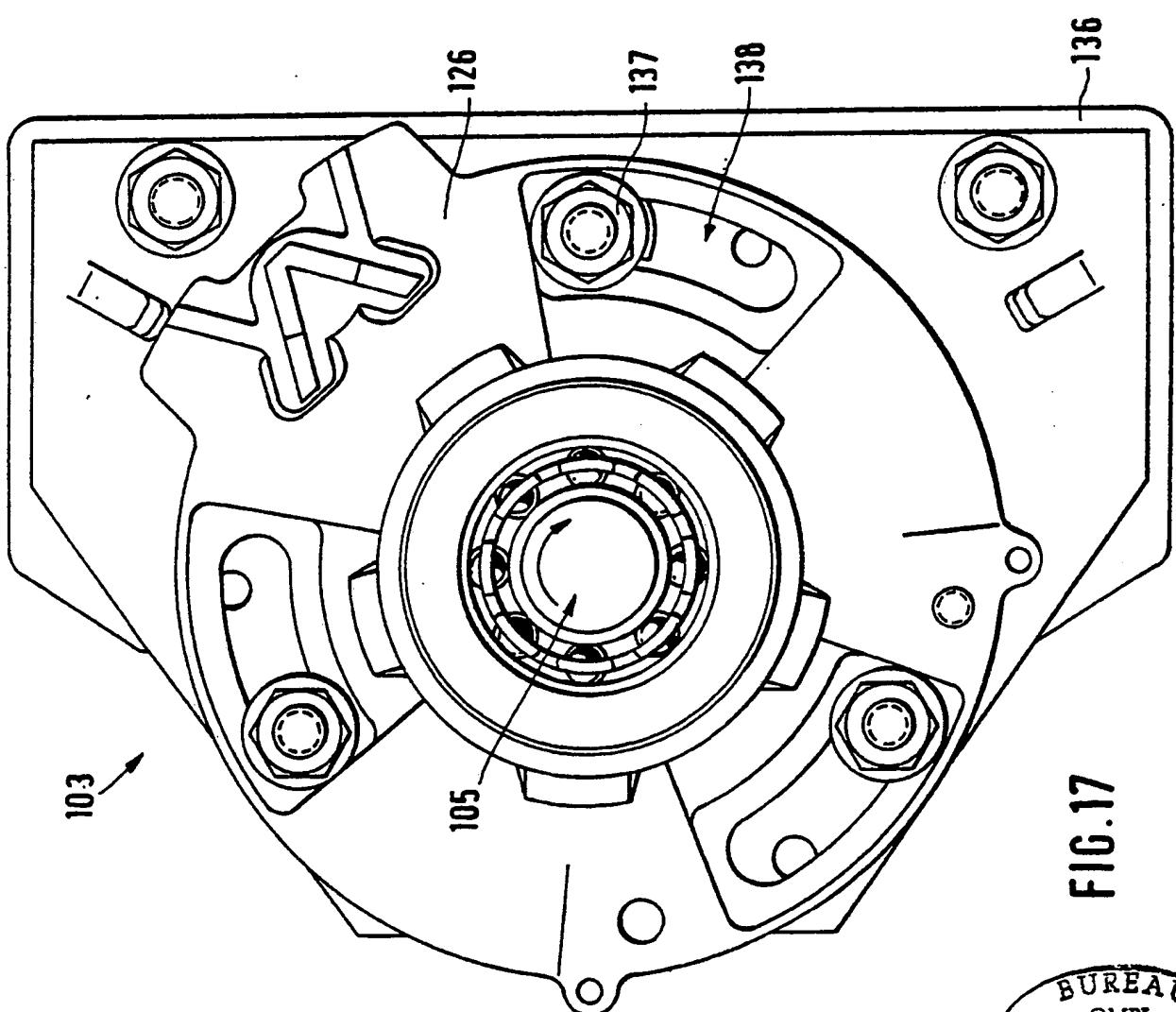
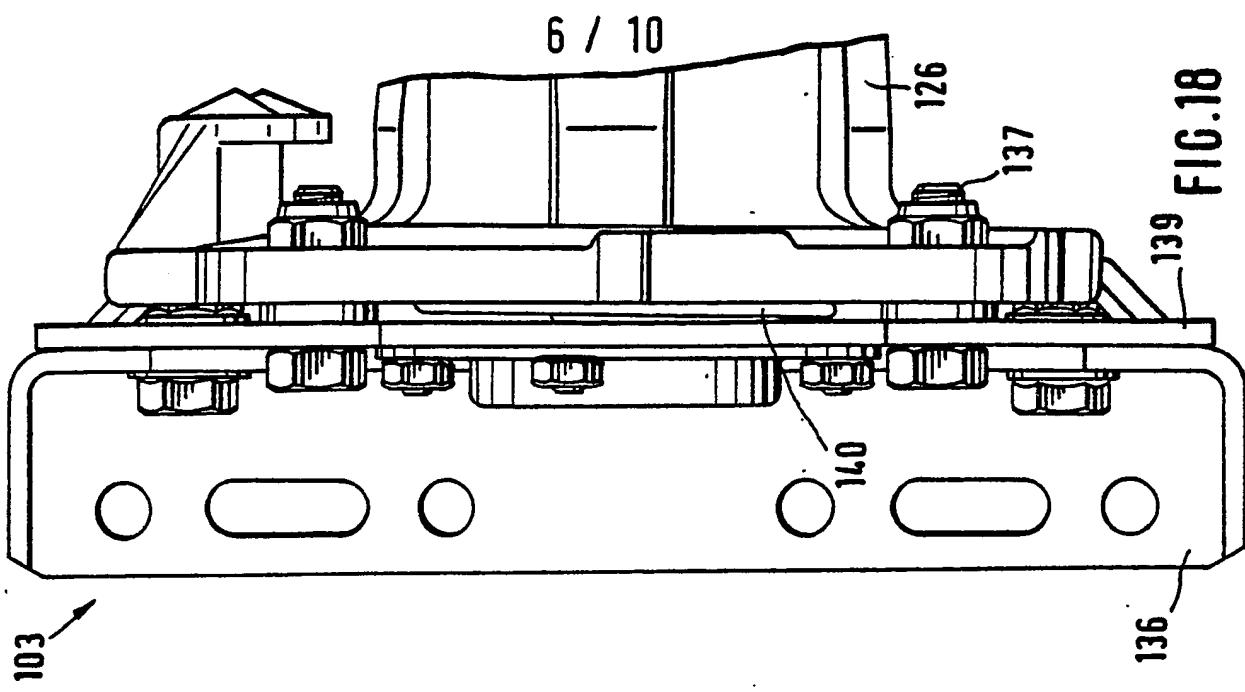


FIG. 8A







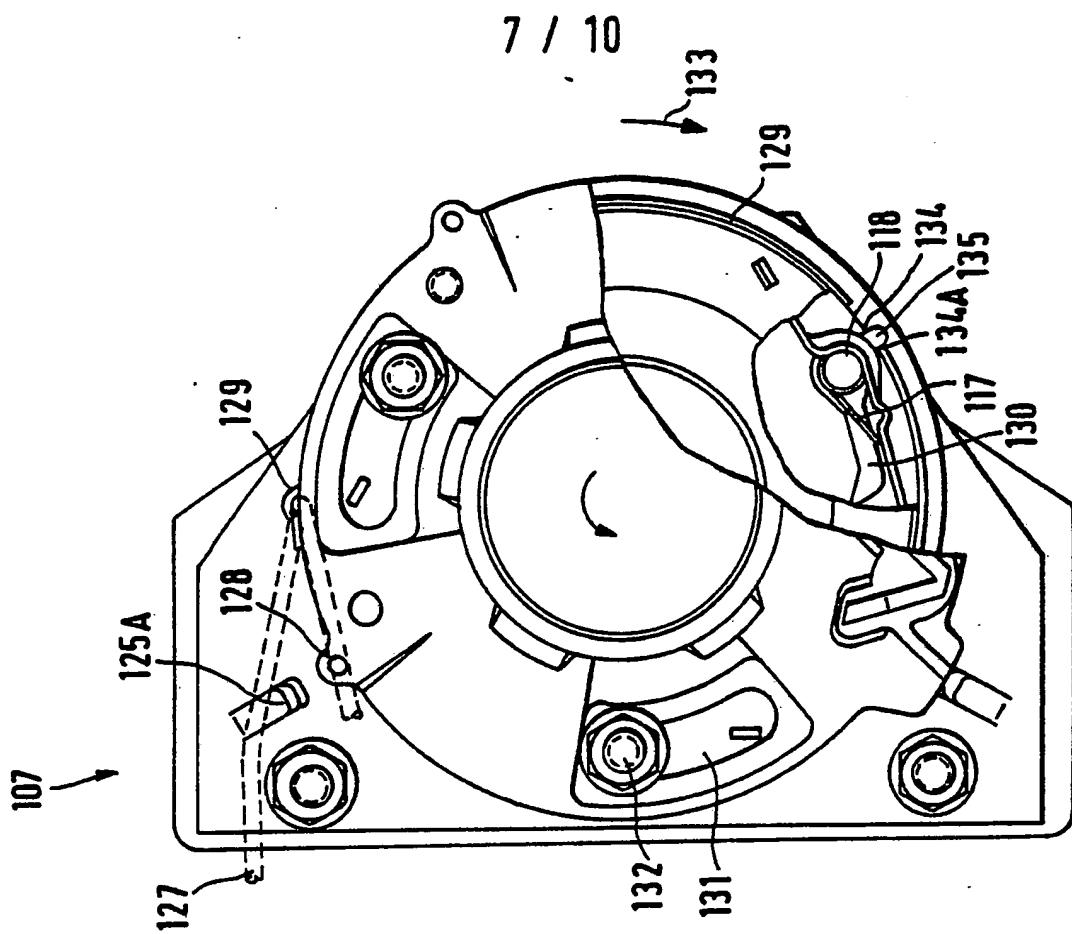


FIG. 20

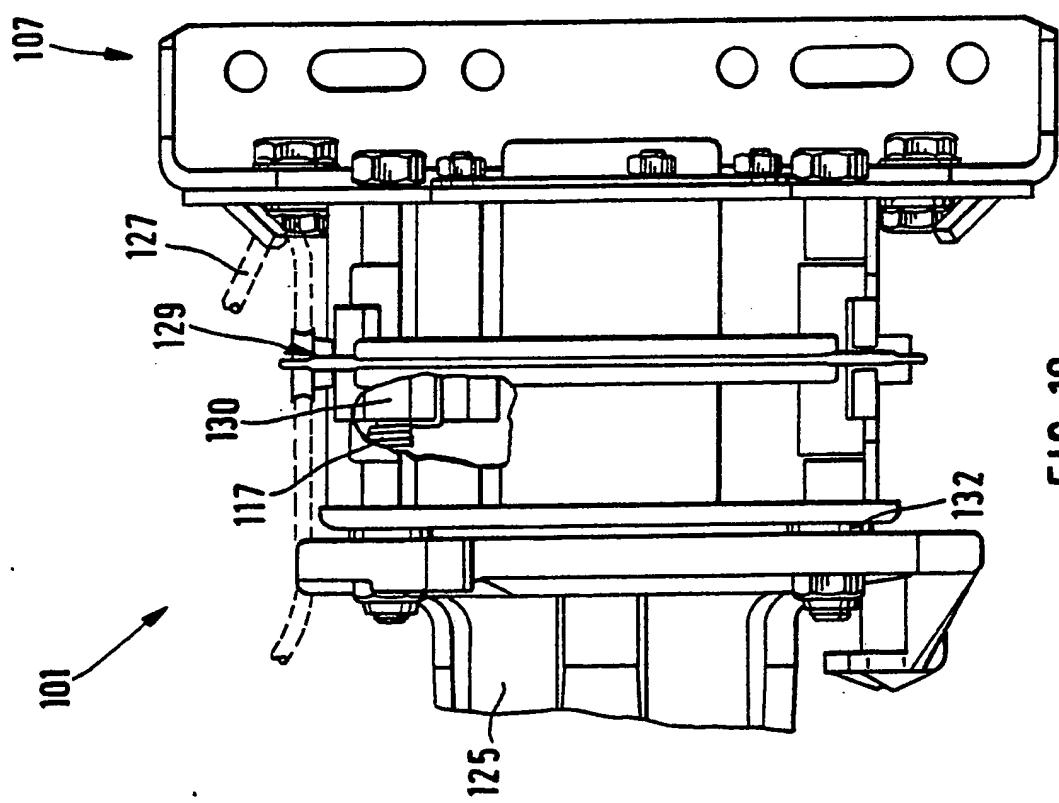
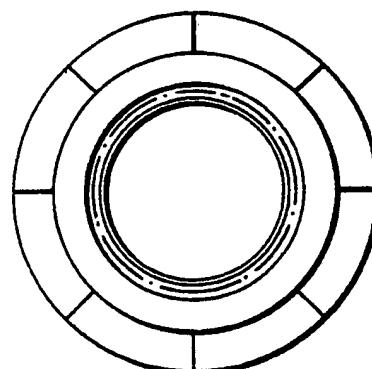
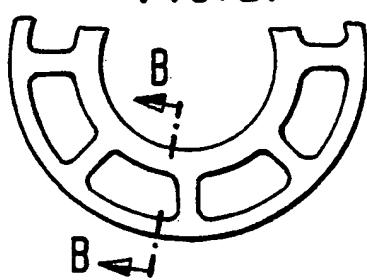
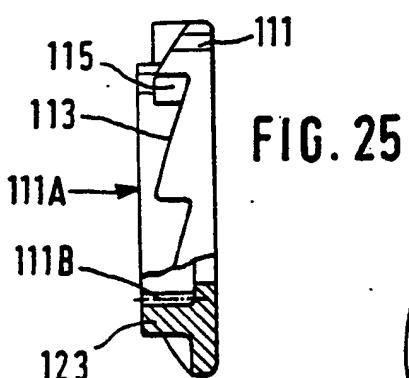
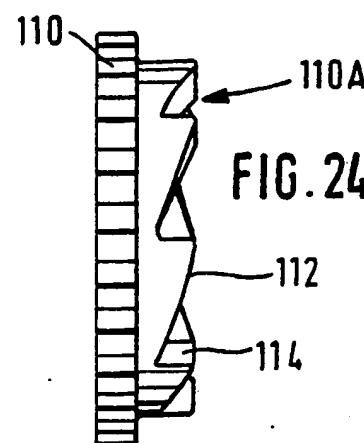
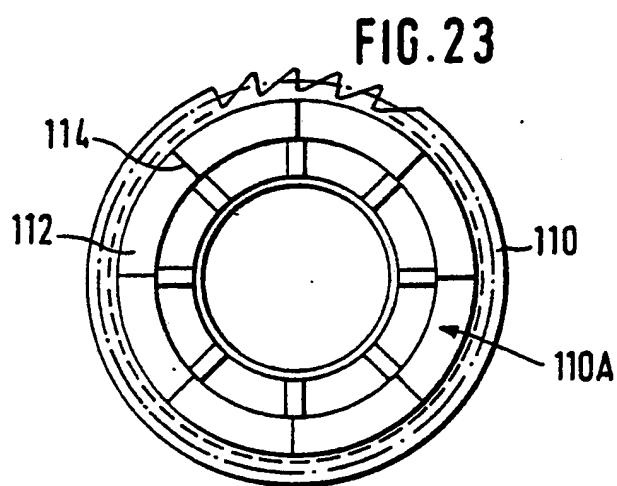
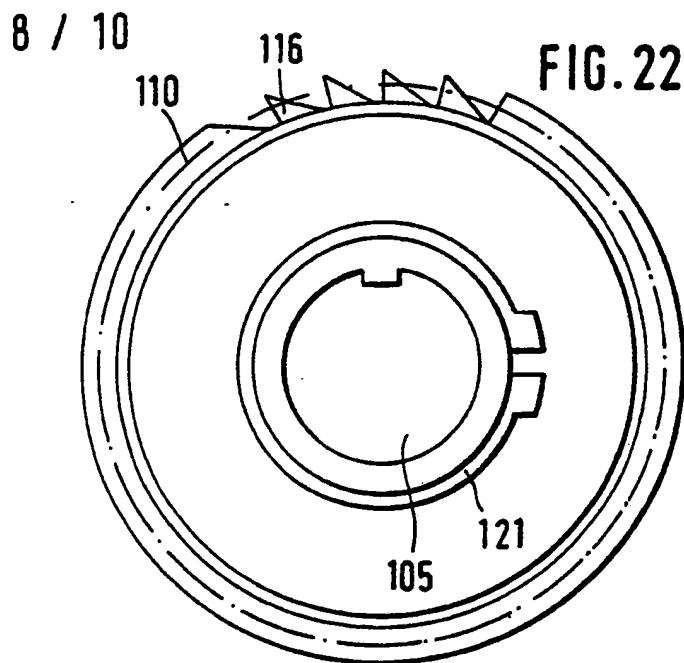
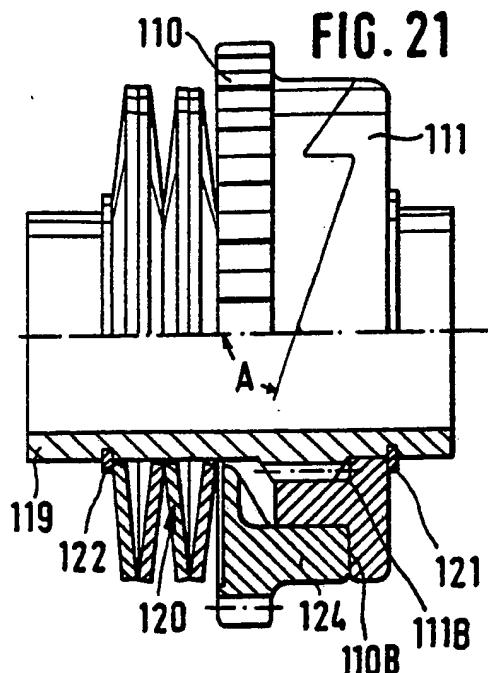


FIG. 19

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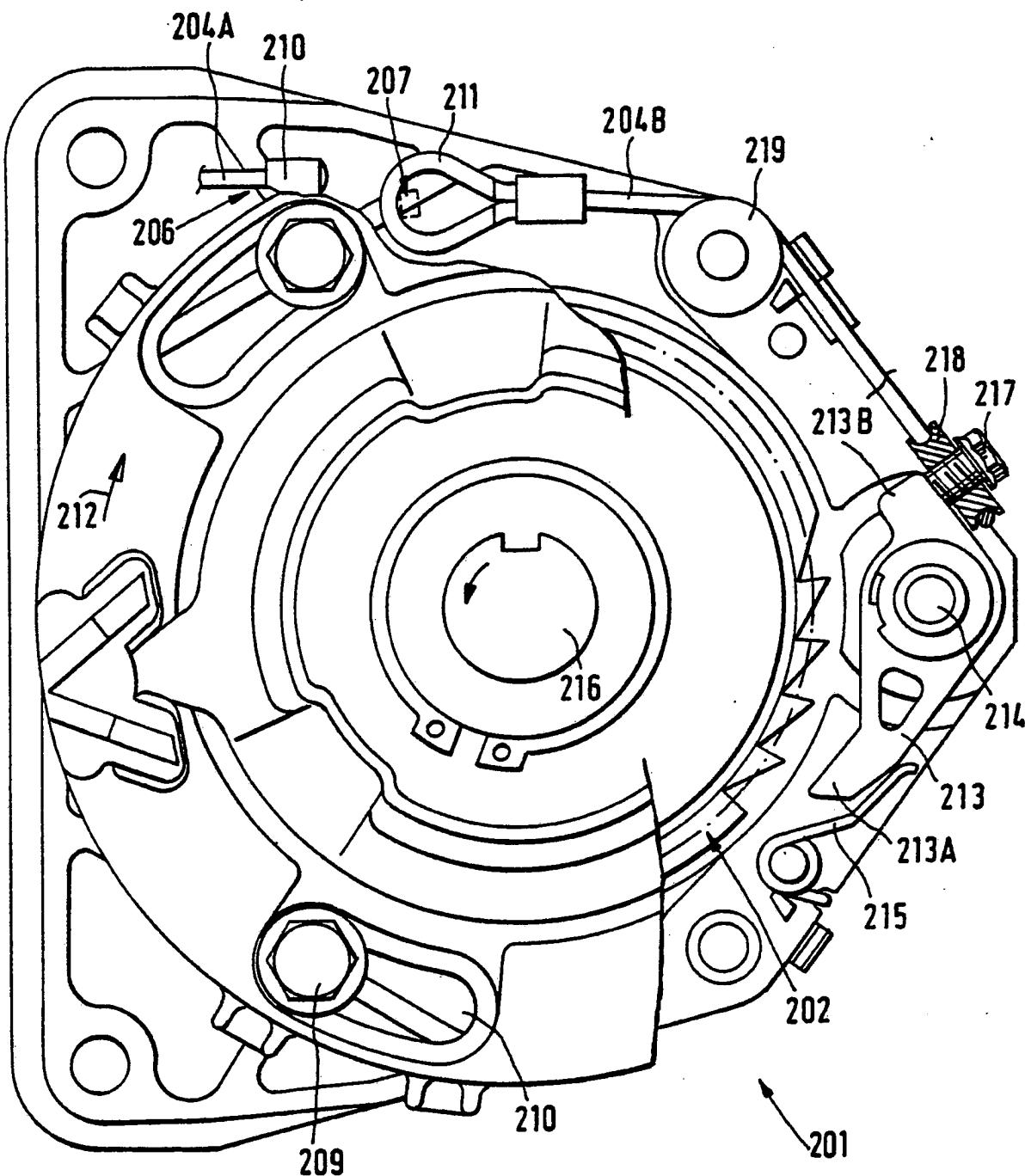


FIG.28

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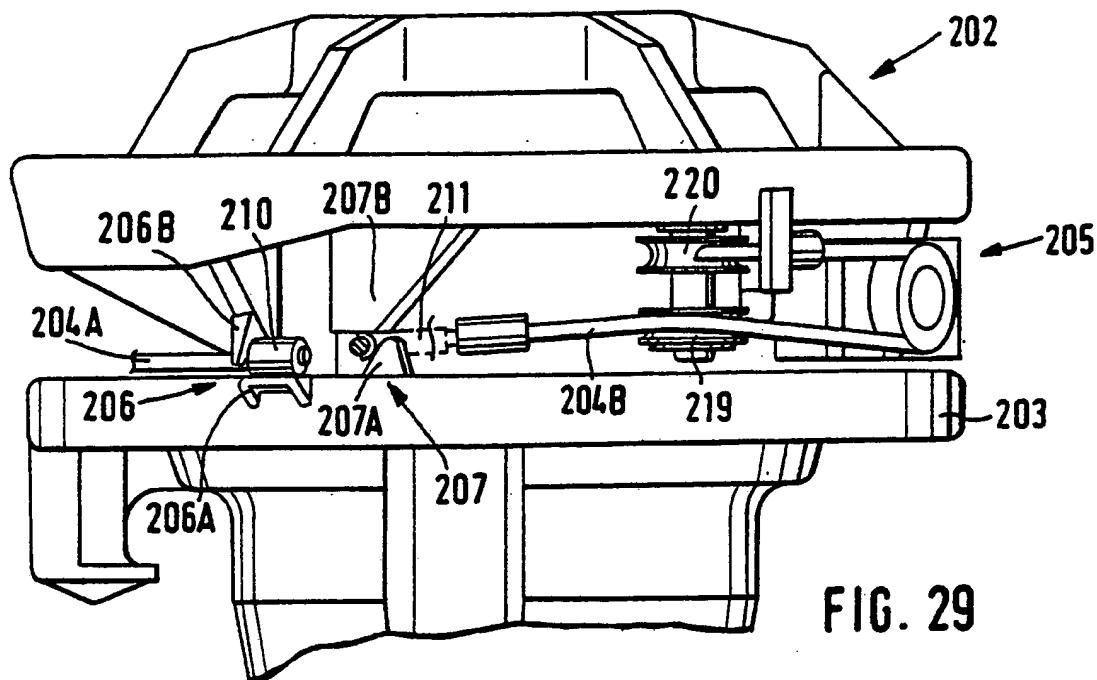


FIG. 29

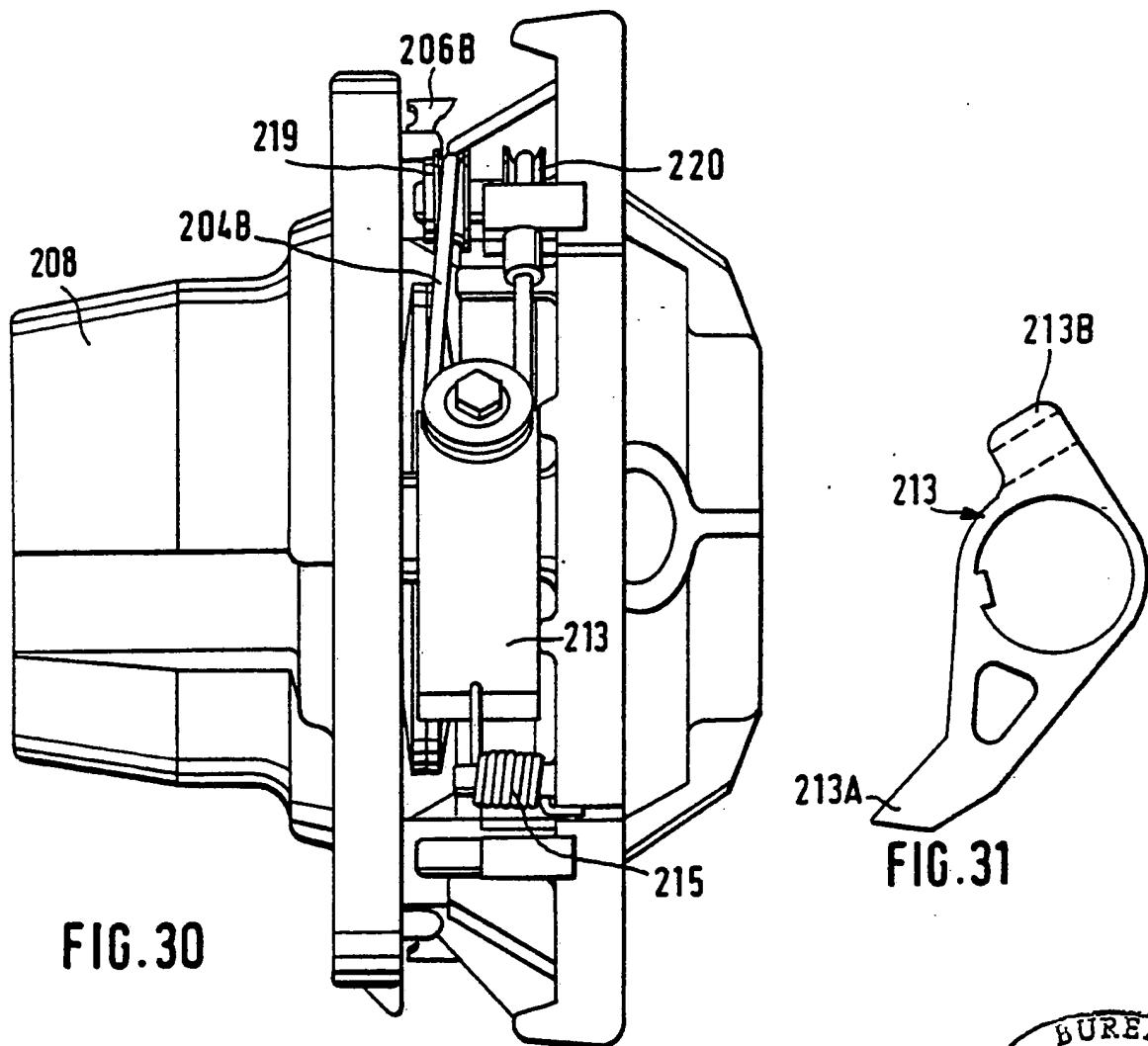


FIG. 30

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INTERNATIONAL SEARCH REPORT

International Application No PCT/SE83/00336

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) *

According to International Patent Classification (IPC) or to both National Classification and IPC³

E 05 D 17/00, E 05 F 15/10

II. FIELDS SEARCHED

Minimum Documentation Searched *

Classification System	Classification Symbols
IPC 3	E 05 D 17/00, 15/16-24; E 05 F 15/11,16,20; B 66 D 5/12-14; F 16 D 7/04
National C	G8d:18

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched *

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT^{1,4}

Category *	Citation of Document, ^{1,6} with indication, where appropriate, of the relevant passages ^{1,7}	Relevant to Claim No. ^{1,8}
X	SE, B, 341 681 (WINDSOR DOOR AB) 28 August 1971	1,2,8
Y	SE, B, 341 681 (WINDSOR DOOR AB) 28 August 1971	1-10
X	US, A, 2 878 865 (E.J. MANLEY) 24 March 1959	1,8
Y	US, A, 2 878 865 (E.J. MANLEY) 24 March 1959	1-10
X	US, A, 1 863 961 (M.C. BALL ET AL) 21 June 1932	1,8
Y	US, A, 1 863 961 (M.C. BALL ET AL) 21 June 1932	1-10
Y	FR, A, 2 337 805 (J. VOGT) 5 August 1977 & BE, 850096 DE, 2600446 CH, 614489 AT, 370495	6
		.../...

* Special categories of cited documents: ^{1,6}

- "A" document defining the general state of the art which is not considered to be of particular relevance
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- "O" document referring to an oral disclosure, use, exhibition or other means
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"T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search *

1984-04-03

Date of Mailing of this International Search Report *

1984-04-18

International Searching Authority *

Swedish Patent Office

Signature of Authorized Officer *


Christer Wendenius

L.E.

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

II

Fields searched (cont.)

US Cl 49:322, 199-200
160:189-193
187:77-78, 81

V. OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE¹⁰

This International search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. Claim numbers because they relate to subject matter¹¹ not required to be searched by this Authority, namely:

2. Claim numbers because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out¹², specifically:

VI. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING¹³

This International Searching Authority found multiple inventions in this International application as follows:

1. As all required additional search fees were timely paid by the applicant, this International search report covers all searchable claims of the International application.

2. As only some of the required additional search fees were timely paid by the applicant, this International search report covers only those claims of the International application for which fees were paid, specifically claims:

3. No required additional search fees were timely paid by the applicant. Consequently, this International search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

The additional search fees were accompanied by applicant's protest.
 No protest accompanied the payment of additional search fees.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No ¹⁸
Y	DE, A, 2 447 090 (M. WALDNER KG) 8 April 1976 & BE, 823643 NL, 7502975 FR, 2286939 CH, 578107 GB, 1448428 AT, 342005	3-5
Y	FR, A, 1 043 611 (ETABLISSEMENTS AD. MISCHLER) 10 November 1953	3-5
Y	DE, A, 2 736 329 (R.A. MAURER KG) 22 February 1979	6,10
A	DE, C, 2 649 629 (M. MÖRMANN) 3 May 1978	
A	GB, A, 1 013 115 (E HILL ALDAM & CO) 15 December 1965	

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